



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/005,861	11/08/2001	Daniel C. Edelstein	FIS9-2001-0156	2803
7590	10-08/2004		EXAMINER	
Philmore H. Colburn II Cantor Colburn LLP 55 Griffin Road South Bloomfield, CT 06002			FULLER, ERIC B	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 10/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/005,861		EDELSTEIN ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Eric B Fuller		1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 03 August 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 6-13, and 15-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Cho et al. (US 6,486,082).

Cho teaches a method of depositing SiCOH films having a dielectric constant of 2.5 or less by PECVD (abstract). Applicant's precursors are taught (column 3, lines 25-35). Carbon monoxide is taught to be the oxidation source (column 4, lines 25-30). Reaction and annealing temperatures are taught in column 4, lines 15-20 and lines 41-50, respectively. The reactor is a parallel plate reactor (column 4, lines 65-68). Carrier gases are taught (column 5, lines 15-20).

Claim 20 is rejected under 35 U.S.C. 102(e) as being anticipated by Grill et al. (US 6,147,009).

Grill teaches a process of forming a hydrogenated oxidized silicon carbon film (column 4, lines 65-66) by PECVD (column 5, line 19). The reference reads on the

Art Unit: 1762

applicant's precursors (column 3, lines 15-30) and dielectric constant (column 6, line 12). The reference teaches that the oxidizer source is "at least one member selected from the group consisting of hydrogen, oxygen, germanium, nitrogen and fluorine containing gases" (column 10, lines 59-62). Thus, the reference anticipates using oxygen, by itself, as the oxidizer. Using oxygen as the only oxidizing source reads on the applicant's limitation of "substantially free of nitrogen".

Claim 20 is rejected under 35 U.S.C. 102(e) as being anticipated by Loboda et al. (US 6,159,871).

Loboda teaches a method of depositing a HSiOC film by PECVD (abstract). Tetramethylsilane may be the precursor (column 2, line 59). The dielectric constant of the resulting film is within the applicant's range (tables). The reference teaches that the "oxygen providing gases include, but are not limited to air, ozone, oxygen, nitrous oxide, and nitric oxide, preferably nitrous oxide" (column 3, lines 1-5). Thus, the reference anticipates using oxygen, by itself, as the oxidizer. Using oxygen as the only oxidizing source reads on the applicant's limitation of "substantially free of nitrogen".

Claim 20 is rejected under 35 U.S.C. 102(e) as being anticipated by Cheung et al. (US 6,348,725 B2).

Cheung teaches a process of forming a hydrogenated oxidized silicon carbon film (column 5, lines 23-30) by PECVD (column 14 line 7). The reference reads on the applicant's precursors (tables; column 15 lines 4-13) and dielectric constant (column 19,

Art Unit: 1762

lines 1-4). The reference teaches that the oxidizer source may be carbon dioxide (column 6, lines 10-12). Thus, the reference anticipates using carbon dioxide, by itself, as the oxidizer. Using carbon dioxide as the only oxidizing source reads on the applicant's limitation of "substantially free of nitrogen".

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cho et al. (US 6,486,082), as applied to claim 13 above, and further in view of Grill et al. (US 6,147,009).

Cho teaches the limitations of claim 13, but is silent to the component that is the carrier gas. However, Grill teaches that argon is used for plasma depositions involving the same precursors and product. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use argon as the carrier gas. By doing so, one would have a reasonable expectation of success, as Grill teaches the art recognized suitability of using argon as the carrier gas.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cho et al. (US 6,486,082), as applied to claim 13 above, and further in view of Loboda et al. (US 6,159,871).

Cho teaches the limitations of claim 13, but is silent to the component that is the carrier gas. However, Loboda teaches that argon is used for plasma depositions involving the same precursors and product. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use argon as the carrier gas. By doing so, one would have a reasonable expectation of success, as Grill teaches the art recognized suitability of using argon as the carrier gas.

Claims 1-4 and 6-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grill et al. (US 6,147,009) in view of Cho et al. (US 6,486,082).

Grill teaches a process of forming a hydrogenated oxidized silicon carbon film (column 4, lines 65-66) by PECVD (column 5, line 19). The reference reads on the applicant's precursors (column 3, lines 15-30), temperature (column 3, lines 30-35), annealing (column 3, lines 10-15), parallel plate reactor (column 3, lines 1-5), carrier gases (column 6, line 64), flow ratios (column 6, lines 25-35), and dielectric constant (column 6, line 12). The reference teaches that the oxidizer source is "at least one member selected from the group consisting of hydrogen, oxygen, germanium, nitrogen and fluorine containing gases" (column 10, lines 59-62). The reference fails to teach the use of carbon monoxide as the oxidizer.

However, Cho teaches that carbon monoxide may be used as the oxidizer. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize carbon dioxide as the oxidizing gas in the process taught by Grill. By doing so, one would have a reasonable expectation of success, as Cho teaches the art recognized suitability of using carbon monoxide.

Claims 1-4 and 6-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Loboda et al. (US 6,159,871), in view of Cho et al. (US 6,486,082).

Loboda teaches a method of depositing a HSiOC film by PECVD (abstract). Methylsilane may be the precursor (column 2, line 57). The temperature is within the applicant's range (column 3, line 26). The dielectric constant of the resulting film is within the applicant's range (tables). The process is performed in a parallel plate reactor (column 4, lines 45-50). Argon may be used as a diluent gas (column 3, lines 13-15). The oxidizer flow rate is within the applicant's range (column 3, lines 4-10). The annealing step is taught (tables). The reference teaches that the "oxygen providing gases include, but are not limited to air, ozone, oxygen, nitrous oxide, and nitric oxide, preferably nitrous oxide" (column 3, lines 1-5). The reference fails to teach the use of carbon dioxide as the oxidizer.

However, Cho teaches that carbon monoxide may be used as the oxidizer. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize carbon dioxide as the oxidizing gas in the process

Art Unit: 1762

taught by Loboda. By doing so, one would have a reasonable expectation of success, as Cho teaches the art recognized suitability of using carbon monoxide.

As to claim 6, Cho, teaches using tetramethylcyclotetrasiloxane (TMCTS) as the precursor. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use TMTCTS in the process taught by Loboda. By doing so, one would have a reasonable expectation of success, as Cho teaches the art recognized suitability of using TMCTS.

Claims 1-4 and 6-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheung et al. (US 6,348,725 B2), in view of Cho et al. (US 6,486,082).

Cheung teaches a process of forming a hydrogenated oxidized silicon carbon film (column 5, lines 23-30) by PECVD (column 14 line 7). The reference reads on the applicant's precursors (tables; column 15 lines 4-13), temperature (column 6, lines 30-37), parallel plate reactor (column 8, lines 25-30), carrier gases (column 12, line 25), flow ratios (example), and dielectric constant (column 19, lines 1-4). The reference teaches that the oxidizer source may be carbon dioxide (column 6, lines 10-12). The reference is silent to using carbon monoxide as the oxidizer.

However, Cho teaches that carbon monoxide or carbon dioxide may be used as the oxidizer. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize carbon dioxide as the oxidizing gas in the process taught by Cheung. By doing so, one would have a reasonable expectation of



success, as Cho teaches the art recognized suitability of using carbon monoxide in place of carbon dioxide.

As to claim 11, Cho teaches that annealing reduces the moisture in the deposited film. It would have been obvious at the time the invention was made to a person having ordinary skill in the art to anneal the film of Cheung. By doing so, one would reap the benefits of reducing moisture.

### ***Response to Arguments***

Applicant argues that the cited prior art fails to teach all the limitations of the claims, as they have been amended. Examiner agrees and has withdrawn the rejections of the previous Office Action accordingly. However, applicant's arguments are moot in view of the new grounds of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

Art Unit: 1762

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

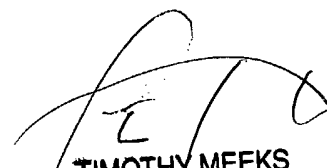
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (571) 272-1420. The examiner can normally be reached on Mondays through Thursdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P Beck, can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



EBF



TIMOTHY MEEKS  
PRIMARY EXAMINER